

TRAINING  
PRO RIDER



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# THE ART OF LEANING IN

Words: Howard Mansell

Which way do you lean when riding through a corner? Do you lean in and push the bike up, or do you sit up and push the bike down? One technique works for low speed and gravel while the other should be your natural position when you're not riding straight ahead. Howard explains...



Leaning in makes the bike want to turn

**M**any riders have a bad habit of cornering with an off-lean. In fact, some people actually believe that it is correct to “push the bike down” (in other words, to purposely off lean). While this is ok at very low speed and in gravel, it's totally incorrect for cornering on the road at speeds above 30km.

Why is this such a bad thing? Let's have a look at the physics of motorcycles in corners and how the rider can dramatically affect the bike, either positively or negatively.

### CENTRE OF GRAVITY

Understanding Centre of Gravity (COG) is important. It is the combination of the rider's weight and the bike's weight. It is dynamic and so can be used to counter centrifugal force when cornering.

### WHAT IS COG?

When a motorcycle is balanced on its wheels, travelling straight with the rider sitting centrally, there is the natural action of gravity pulling down. The COG location is a combination of the bike's mass and the rider's mass. With a rider perched on top, the COG is higher than

the bike would have on its own. The rider affects the position of the COG.

### WHAT WOULD HAPPEN IF THE BIKE WAS TO CORNER WITHOUT THE RIDER?

The bike must lean into the corner to move its COG to counter the centrifugal force. If it doesn't lean, the COG would pivot the bike over the top of the tyre's contact point and cause it to fall to the outside of the corner. Leaning the bike helps the COG move slightly away from the centre line of the bike. The COG “shift” although minor, helps the bike to resist the centrifugal force.

COG “shift” balances against centrifugal force, and the faster that the bike travels, the more centrifugal force and so the more lean angle that is required to counter it.

If the bike was to try to corner without leaning into the turn, the COG remains central, but there would be the same centrifugal force and there is nothing to balance against it. Obviously, the bike falls towards the outside of the corner, the tyre contact point being the pivot point.

### HOW DOES THE RIDER'S WEIGHT AFFECT THE BIKE?

Firstly, it can negatively affect the bike if you're using the wrong technique. If the rider off-leans (pushes the bike down) their weight moves the COG away from the corner. The COG now assists the centrifugal force to try to make the bike fall over, so the bike must lean further against the centrifugal force to turn in the direction that the rider wants to go. The rider is actually working against the bike's needs, and the bike must compensate for this by leaning more. The result is that ground clearance is reduced, and the tyre's contact points are closer to the edge (the slipping point)

But, it can positively affect the bike if the rider leans into the corner. The combined weight of bike and rider is now on the inside of the corner, and so the COG moves to the inside, helping the bike to resist the centrifugal force. Now the bike can turn with a much-reduced lean angle while travelling around the same corner at the same speed. The ground clearance is increased, the tyres have more bike weight on them and are further from the slipping point. This is a very good thing! Especially if the surface is loose or wet! ➤



Not just for the racetrack



## WHY IS THIS SO IMPORTANT?

It is always a bad thing to have the ground clearance reduced. It could be a matter of just a few millimetres difference, but it can dramatically affect things such as too much speed or a bump in the corner. If the bike runs out of ground clearance, it will refuse to turn tighter. In a corner with bad camber or a diminishing radius, no further lean is possible, and the bike will very likely leave the road.

Any bike will perform better in a corner if it is kept at a lesser lean angle; the suspension will work better (absorb the bumps better), and the weight of the bike is better applied to the tyres contact patch so they can grip better (hugely important on wet roads).

Corners are not always smooth, so when the bike goes over a bump, the suspension will work, and at some point, the lowest part of the bike may touch down. When it does, that extra contact point takes weight from the tyres which reduces their grip that may already be near the point of slipping. This is especially important for bikes with a lesser ground clearance, like cruiser bikes.

## HOW DO YOU KNOW IF YOU ARE OFF LEANING?

If your head is on the outside of the bike's centreline, you are off leaning. Roughly 80% of riders are making this mistake every time they ride. They fight the bike's need to lean into the turn and therefore they increase the likelihood of grounding the bike. They also increase the likelihood of the tyres slipping, and they make things incredibly difficult for themselves when the corner tightens or when they have misjudged their speed.

It's hard to understand why riders do this. It may be a fear of falling over or it may be that they have come from riding dirt bikes where this technique works. Whatever the reason is, if you are doing it, resist the temptation. Consider this, if you were running after someone, which way would you lean to go around a corner? Simple, really.

"Leaning in" helps any style of bike as the physics don't change. Look at the inside arm of riders on a racetrack, bent down, shoulders and head on the inside. It is so easy to do and it's what we do naturally. When we do it, the bike feels light and responds beautifully, turns easily, the rider feels one with the bike and the joy of riding corners puts a smile on the face. I've watched the joy come into the faces of many riders who try it for the first time in years, and it's great to see the surprise and wonder.



**"If your head is on the outside of the bike's centreline, you are off leaning."**



Even works with three wheels!